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(54) Process and machine for producing blocks of pressed vibrated concrete.

(57) Improved process and machine for producing pressed vibrated concrete blocks, in which provision is made for a suitable vertical displacement of the countermold in its block-delivery step, whereby the blocks are delicately laid on the ground.

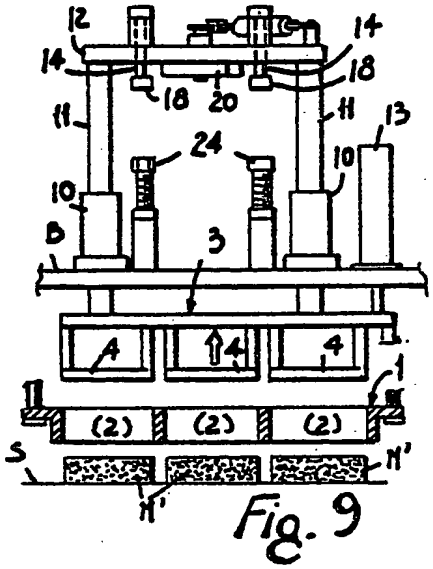

Fig. 9

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Process and machine f r producing blocks of pressed vibrated concrete.

The invention relates to a process for producting pressed vibrated concrete blocks in a mold closed at its bottom with a plate.

The object of the invention is to perform a process of the above specified kind, which is achieved in a simpler and faster manner than the known processes, whereby a higher productivity can be obtained.

This problem is solved by the invention by providing a process which is characterized the combination of the steps as claimed in Claim 1.

An advantageous modified embodiment of this process is claimed in Claim 2.

The invention provides also a particular machine for carrying out the process according to Claim 1. The said machine is characterized in Claim 3.

One embodiment of the invention will be described in more detail hereinafter by referring to the accompanying drawing, in which:

Figures 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 are diagrammatic side and front sectional views respectively showing the main components of the machine in the successive steps of the machine operative cycle.

Figures 11 and 12 are detail views respectively taken on section lines XI-XI and XII-XII in Figure 5.

In Figure 1 there is shown the mold 1 in its end-of-stroke block-delivery position, the mold cavities 2, the countermold 3 in its uppermost rest position, the countermold male portions 4 which have a shape that mates the shape of the mold cavities 2.

The components 1 and 3 are connected to respective means to be described later, for guiding and vertically displacing the said components, which are equipped with respective not-shown vibrators.

The horizontal plate 5 is located at a short distance from the ground S and is connected to guide and translation means that upon control place this plate beneath the mold bottom, or withdraw the same from under the horizontal extension thereof, as shown in Figure 1 by dash lines and by a solid line, respectively.

The box 6 for the supply of concrete is positioned beside the mold at a fixed height, and is connected to not-shown translation means, with its bottom being closed by a fixed plate 7 having one of its sides located at a short distance from the said mold. When the box 6 is in its rest position as in Figure 1, this box lies under a charging hopper 8 which upon control delivers into the said box a proper amount of concrete M.

On starting its operative cycle (Figure 2), the plate 5 comes to be positioned under the mold 1, and the mold 1 is lowered and brought into contact with the said plate, which thus closes the mold cavities 2. In timed relation the box 6 is translated and positioned over the mold 1, to fill the mold cavities 2 with the material M. Attached to the upper side of the box perimeter are brushes 9 which during this step interfere with, and clean the underside of the countermold 3 male portions 4.

In the step shown in Figure 2, the mold is vibrated so as to cause the material M to properly and uniformly settle in the mold cavities 2.

In the subsequent step as in Figure 3, the box 6 is returned into rest position, while leaving the mold cavities 2 filled with the material M. Also in this step the brushes 9 clean the countermold male portions 4. Then, as seen in Figures 4 and 5, the countermold is so controlled as to be lowered down and caused to perform its pressing action, while the vibrators acting upon the said countermold and on mold 1 are being actuated, whereby the material in the mold cavities 2 will be suitably compacted, so that blocks M′ having a high mechanical strength and same properties, are molded. The countermold 3 is lowered down so as to directly or indirectly interfere with a limit stop means made, for example, as described hereunder.

In Figure 5, reference B denotes the stationary frame of the machine, which by means of guides 10 supports the vertical rods 11 carrying the assembly of the countermold 3 and being at their top ends interconnected by a beam 12. Shown at 13 is one of the hydraulic jacks which are, for example, mounted on the frame B, and which by acting on the countermold assembly or on the beam 12, vertically displace and press down as required the countermold 3.

According to the invention, two like vertical bolts 14 are fitted in beam 12, in a symmetric position relative to the rods 11, and the said bolts are slidable in respective fixed guides 15 (see also Figure 11) and are urged downwards by springs 16 holding the bolt heads 17 into abutment against the top ends of guides 15. The bolts 14 project from the underside of beam 12 by a section of a length which is equal to, or is greater than the thickness of plate 5, the lower end of said bolts being provided with an enlarged portion or head 18.

Note in Figures 5 and 12 that a flat butterfly-lik member 20 is mounted on beam 12 for rotation about a vertical shaft 19 located in an equidistant relation with th bolts 14; the said member is

substantially set in contact with the lower face of said beam 12, and is of a thickness that is equal to, or is slightly greater than the thickness of the said plate 5, the said butterfly-like member 20 having the ends shaped as shown at 120, whereby it can be caused to hook the downwardly projecting section of bolts 14, between their enlarged heads 18 and the beam 12.

In its section projecting from the upper side of beam 12, the shaft 19 is provided with a small lever arm 21 to which a double-acting hydraulic jack 22 is connected and has its body anchored at 23 to the said beam 12. On the jack being actuated, the butterfly-like member 20 is rotated and is caused to pass from the position shown by solid lines in Figure 12 to the position shown by dash lines, or vice-versa.

When the countermold is so controlled as to be caused to perform its active molding stroke, the butterfly-like member 20 is located in its active position as in Figure 5. The descent of the countermold is stopped when the enlarged heads 18 of bolts 14 come to abut against end-of-stroke abutments 24 mounted on the top of frame B. By changing the height of these abutments, the thickness of the blocks molded in the mold 1 will be modified. When the stop condition as in Figure 5 is established, the feeding to the jacks 13 is discontinued, so that the countermold is stopped.

In phase succession the plate 5 is upon control removed from the mold (Figure 6). Then the jack 22 is operated in the reverse direction to have the butterfly-like member 20 rotated into the dash-line position as in Figure 12, whereby the ends of this member will be withdrawn from the horizontal projection of the enlarged heads 18 of bolts 14.

The jacks 13 are thereafter actuated to lower down the countermold (Figure 7). The countermold is stopped when the enlarged heads 18 of bolts 14 come to abut against the underside of beam 12. During this step the countermold 3 performs an extra stroke which is equal to the thickness of the butterfly-like member 20, and the molded blocks M′ are caused to get out from the lower side of the mold cavities 2, to such an extent that they are delicately laid on the ground S.

From this step onwards, the operative cycle of the machine is continued in a conventional manner. While the countermold 3 is being temporaneously kept at standstill (Figure 8), the mold 1 is upon control lifted up, to cause a complete delivery of the blocks M′ from the mold. During the uplifting of the mold - once the delivery of the blocks has been completed, the mold interferes with members 25 of the countermold assembly and lifts up also th said count rmold. By its own jacks 13, the countermold 3 is returned into its uppermost cycle-starting position (Figure 1), and th butterfly-lik member 20 is again operated and returned into its position shown in Figure 5, as the plate 5 is returned under the mold 1.

The machine is made ready for repeating a new operative cycle by being translated horizontally along the ground as in Figure 10, so as to have the mold 1 positioned over a clear area of the ground.

It is apparent that thanks to the described novel operating process, the blocks are delivered from the mold and are delicately laid on the ground, whereby any inconveniences arising from the known art, are avoided.

It should be understood that the illustrated solution for stopping twice the stroke of the countermold being lowered down merely has an illustrative purpose, so that the means by which such a dual stopping is achieved may be of a different construction, and may be differently arranged. It is, for example, not incompatible that a similar drawer-like-movable plate may be used in place of th butterfly-like member 20. The means by which such a dual stopping is achieved, instead of being located on the beam 12, may differently act on the guide rods 11 or on the platen carrying the countermold, or on other components. The double-acting limit stop means mounted on the beam 12 may be otherwise mounted on the frame B in place of the abutments 24, which will then be placed on the said beam 12.

According to a modified process, provisions may be made, once the blocks have been molded, for the mold and the countermold to be simultaneously lowered down with an extra stroke at least equal to the thickness of plate 5, so as to have the blocks laid on the ground. Then the mold is lifted up, while the countermold is being temporaneously kept stationary, until the condition shown in Figure 8 is established, so that once the blocks have been delivered from the mold, also the countermold will be lifted up and returned into its cycle-starting position.

Claims

1. A process for producing pressed vibrated concrete blocks (M′) in a mold (1) closed at its bottom with a plate characterized by the following operative steps of:

A. Filling with concrete (M) the cavities (2) of the horizontally arranged mold (1) closed at its bottom by the plate (5) located at a short distanc from the ground (S), vibrating the mold (1) to settl the said concrete (M) and levelling the top of th mold (1) to assure a complete uniform filling of the mold cavities (2).

B. Lowering down a countermold (3) to press the concrete (M) previously introduced into the mold cavities (2), and vibrating the mold (1) and the countermold (3).

C. Stopping of the countermold pressing step and of the said vibrations, once the blocks (M′) in the mold cavities (2) have reached the predetermined thickness.

D. Opening the bottom of the mold (1) by removing the bottom plate (5)

E. Causing the molded blocks (M′) to rest by their lower side on the ground (S), preferably by a proportionate lowering of the countermold (3), while the mold (1) is being kept at standstill.

F. Lifting up the mold (1), while the countermold (3) is being temporaneously kept at standstill, to effect the delivery from the mold of the blocks (M′) already resting on the ground (S).

G. Entirely lifting up the countermold (3) and horizontally translating the molding means to position the mold (1) at a clear portion of the ground (S), so that the said operative steps can be repeated.

2. The process according to Claim 1, characterized in that once the concrete blocks have been molded in the mold (1) and the bottom plate (5) has been retracted therefrom, the mold and the countermold (3) are lowered down with no relative movements, until the said mold (1) will have its lower side bearing on the ground (S), whereupon the countermold (3) is being kept temporaneously stationary, and the mold (1) is lifted up to deliver the blocks (M′), then the countermold (3) is lifted up and made ready for repeating a new operative cycle.

3. A machine for carrying out the process according to Claim 1, characterized by comprising provisional limit stop means (18-20) which, in the countermold pressing step, stop the descent of the countermold (3) or of members connected thereto and can be neutralized by a servo control (22), so that the countermold (3) can be lowered down further by an extra stroke of a length which is equal or substantially equal to the thickness of the mold bottom plate (5), whereby the molded blocks (M′) are brought to rest on the ground (S), and the said extra stroke of the countermold (3) is controlled by limit stop means (12) which take over the said provisional removable means.

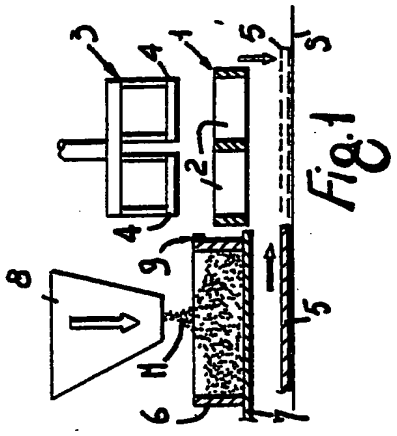

Fig.1

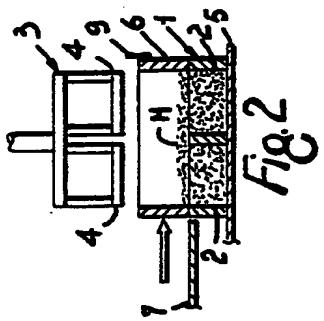

Fig.2

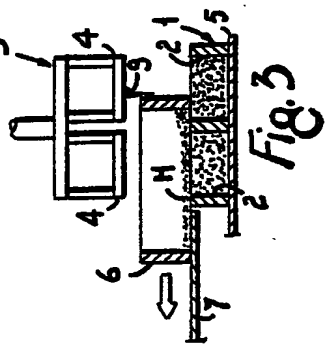

Fig.3

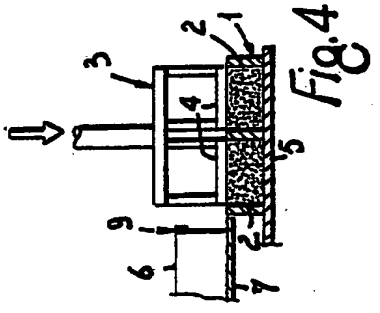

Fig.4

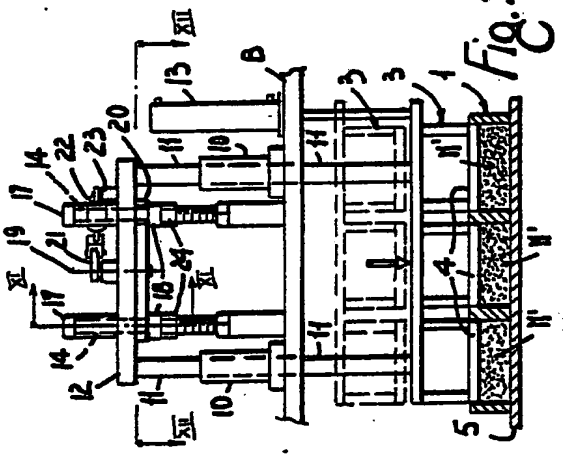

Fig.5

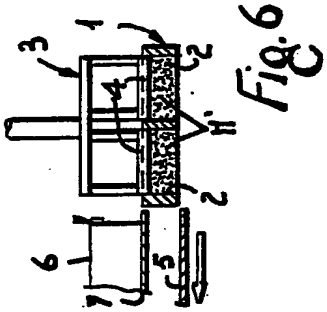

Fig.6

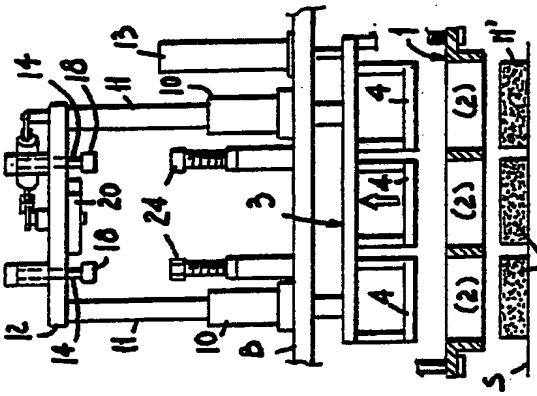

Fig. 9

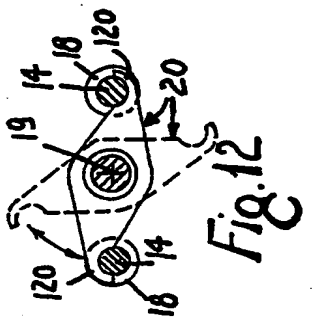

Fig. 12

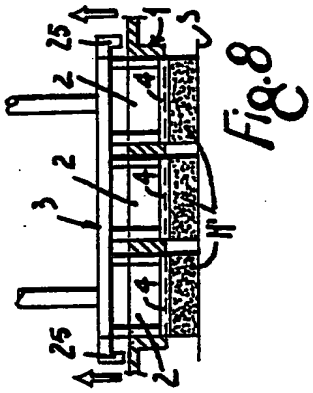

Fig. 8

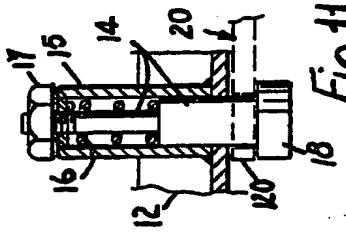

Fig. 11

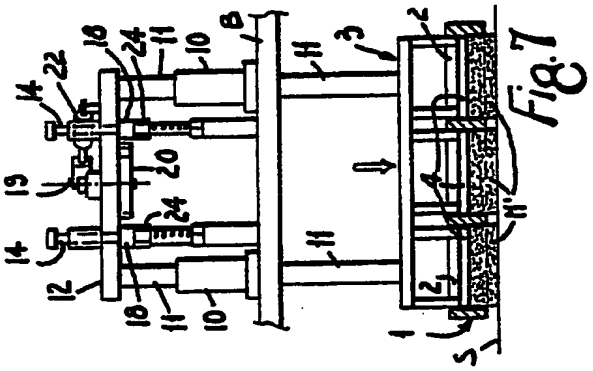

Fig. 7

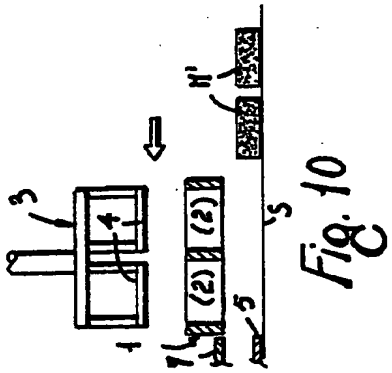

Fig. 10